CLAIMS

WE CLAIM:

1. A method of producing a human neural cell comprising,
   a) providing a pluripotent human cell;
   b) forming an embryoid body by contacting the pluripotent human cell with an essentially serum free medium; and
   c) culturing the embryoid body in an essentially serum free cell differentiation environment

   to thereby produce the human neural cell.

2. The method of Claim 1, wherein the essentially serum free medium of step b) comprises Ham's F12 medium.

3. The method of Claim 1, wherein the essentially serum free medium of step b) comprises a MEDII conditioned medium.

4. The method of Claim 1, wherein the essentially serum free cell differentiation environment of step c) comprises a MEDII conditioned medium.

5. The method of Claim 1, comprising the additional steps performed after step b) and before step c):
   a) dispersing the embryoid body to an essentially single cell suspension;
   b) culturing the essentially single cell suspension in a suspension culture; and
   c) forming a second embryoid body by culturing the essentially single cell suspension with a second essentially serum free medium, wherein the second essentially serum free medium comprises a MEDII conditioned medium.

6. The method of any of Claims 2-5, wherein the essentially serum free medium is essentially LIF free.

7. The method of Claim 5, wherein the second essentially serum free medium comprises DMEM/F12, FGF-2 and a MEDII conditioned medium.

8. The method of Claim 5, wherein the second essentially serum free medium comprises between approximately 10% to approximately 50% MEDII conditioned medium.

9. The method of any of Claims 2-5, wherein the essentially serum free medium, the second essentially serum free medium, and/or the essentially serum free cell differentiation environment comprises less than 5% serum.

10. The method of any of any of Claims 2-5, wherein the cell differentiation environment is selected from the group consisting of adherent culture and suspension culture.

11. The method of Claim 1, wherein the human cell is a pluripotent human cell.

12. The method of Claim 11, wherein the pluripotent human cell is selected from the group consisting of a human embryonic stem cell, a human inner cell mass (ICM)/epiblast cell, a human primitive ectoderm cell, a human primordial germ cell, a human teratocarcinoma cell.

13. The method of Claim 12, wherein the human ICM/epiblast cell or the primitive ectoderm cell is derived *in vitro*.

14. The method of Claim 12, wherein the human ICM/epiblast cell or the primitive ectoderm cell is derived *in vivo*.

15. The method of Claim 12, wherein the human primitive ectoderm cell is an early primitive ectoderm (EPL) cell.

16. The method of Claim 11, wherein the pluripotent human cell is derived by de-differentiation.

17. The method of Claim 11, wherein the pluripotent human cell is derived by nuclear transfer.

18. The method of Claim 11, wherein the pluripotent human cell is a human embryonic stem cell, and wherein the human embryonic stem cell is passaged by selection with a SSEA4 antibody and/or with a sequential collagenase and trypsin treatment prior to forming an embryoid body.

19. The method of Claim 1, wherein the human cell is a multipotent human cell.

20. The method of any of Claims 2-5, wherein the MEDII conditioned medium is a Hep G2 conditioned medium.

21. The method of any of Claims 2-5, wherein the MEDII conditioned medium comprises a component selected from the group consisting of:
    a) a large molecular weight extracellular matrix protein;
    b) a low molecular weight component comprising proline;
    c) a biologically active fragment of any of the proteins or components described in a) or b); and
    d) an analog of any of the proteins or components described in a) or b).

22. The method of Claims 21, wherein the MEDII medium comprises a large molecular weight extracellular matrix protein.

23. The method of Claims 21, wherein the MEDII medium comprises a low molecular weight component comprising proline.

24. The method of Claim 23, wherein the low molecular weight component consists of a proline residue.

25. The method of Claim 23, wherein the low molecular weight component consists of a polypeptide comprising one or more proline residues.

26. A neural cell produced by any of the methods of Claims 1-25.

27. A method for treating a patient, comprising a step of administering to the patient having a neural disease a therapeutically effective amount of the neural cell of Claim 26.

28. The method of Claim 27, wherein the neural disease is Parkinson's disease.

29. A method of producing a partially differentiated pluripotent cell comprising culturing a pluripotent cell culture on a layer of fresh feeder cells, wherein the fresh feeder cells have been plated for less than approximately 48 hours, thereby inducing formation of a more differentiated pluripotent cell.

30. The method of Claim 29, wherein the fresh feeder cells have been plated for less than approximately 24 hours.

31. The method of Claim 29, wherein the fresh feeder cells have been plated for less than approximately 12 hours.

32. The method of Claim 29, wherein the fresh feeder cells have been plated for less than approximately 6 hours.

33. The method of Claim 29, wherein the pluripotent cell culture forms a colony after it is cultured on the layer of fresh feeder cells, and the more differentiated pluripotent cell is selected from the central region of the colony.

34. The method of Claim 33, wherein the more differentiated pluripotent cell expresses less Oct4 than an embryonic stem cell.

35. The partially differentiated cell generated using the method of any of Claims 29-34.

36. A neural cell culture composition comprising a population of neural cells derived *in vitro* from pluripotent cells, wherein the neural cells express one or more detectable markers for tyrosine hydroxylase (TH), vesicular monamine transporter 2 (VMAT2), aromatic amino acid decarboxylase (AADC) and dopamine transporter (DAT).

37. The composition of Claim 36, wherein the cultured cells express all of the detectable markers TH, VMAT2, AADC and DAT.

38. The composition of Claim 36, wherein at least one of the cultured cells expresses all of the detectable markers TH, VMAT2, AADC and DAT.

39. The composition of Claim 36, wherein the neural cell is a human cell.

40. A neural cell culture composition comprising a population of neural cells derived *in vitro* from pluripotent cells, wherein the neural cells express one or more detectable markers for nestin or vimentin, and the neural cells have the capacity to differentiate into cells of a neural lineage.

41. The neural cell culture composition of Claim 40, wherein the neural lineage is selected from the group consisting of neurons and glia.

42. The neural cell culture composition of Claim 40, wherein the neural lineage is selected from the group consisting of neurons, astrocytes, oligodendrocytes and Schwann cells.

43. The neural cell culture composition of Claim 40, wherein the neural cells are differentiated into cells of a neural lineage, and wherein the cells express a neurotransmitter phenotype.

44. The neural cell culture composition of Claim 43, wherein the neurotransmitter phenotype is selected from the group consisting of a GABAergic neuron, a cholinergic neuron, a glutamatergic neuron, a glycinergic neuron, a noradrenergic neuron, an adrenergic neuron, a sertonergic neuron, and a histaminergic neuron.

45. The neural cell culture composition of Claim 44, wherein the neurotransmitter phenotype is a GABAergic neuron that expresses glutamate decarboxylase and/or expresses vesicular inhibitory amino acid transporter/vesicular gaba transporter.

46. The neural cell culture composition of Claim 44, wherein the neurotransmitter phenotype is a cholinergic neuron that expresses choline acetyltransferase and/or vesicular acetylcholine transporter.

47. The neural cell culture composition of Claim 44, wherein the neurotransmitter phenotype is a glutamatergic neuron that expresses vesicular glutamate transporter.

48. The neural cell culture composition of Claim 44, wherein the neurotransmitter phenotype is a glycinergic neuron that expresses vesicular inhibitory amino acid transporter.

49. The neural cell culture composition of Claim 44, wherein the neurotransmitter phenotype is a noradrenergic neuron that expresses norepinephrine transporter.

50. The neural cell culture composition of Claim 44, wherein the neurotransmitter phenotype is a adrenergic neuron that expresses phenylmethanolamine N-methyl transferase.

51. The neural cell culture composition of Claim 44, wherein the neurotransmitter phenotype is a serotonergic neuron that expresses tryptophan hydroxylase or serotonin transporter.

52. The neural cell culture composition of Claim 44, wherein the neurotransmitter phenotype is a histaminergic neuron that expresses histidine decarboxylase.

53. The composition of Claim 40, wherein the neural cell is a human cell.